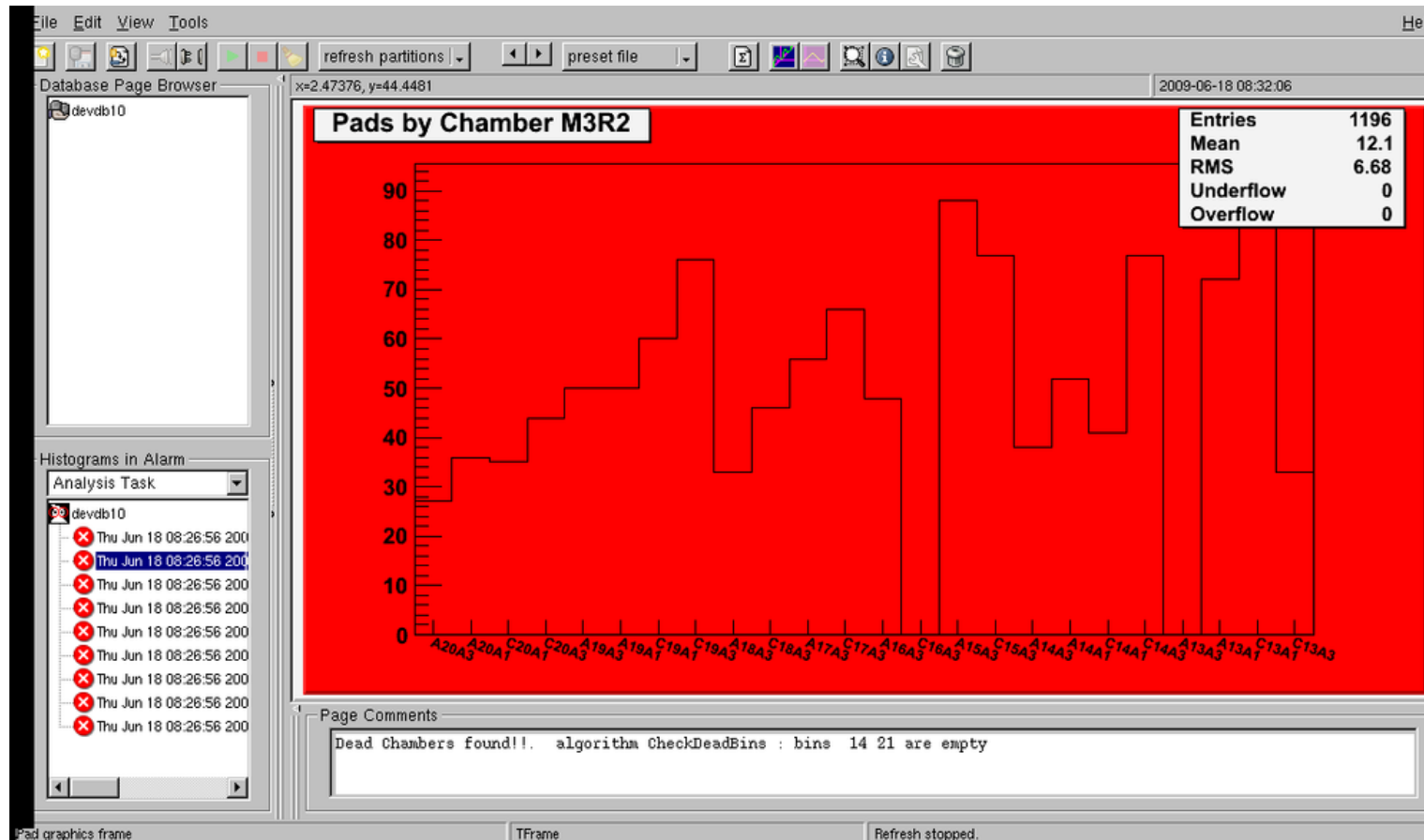# Tools for Automatic Analysis of Online Monitoring Histograms

G.Graziani, Software week June 18th, 2009

Principles

- Automatic checks are performed automatically on every "Saveset" (ROOT file with monitoring histogram of a given task, produced by Gaucho on every save and reset)

- A generic analysis task performs simple checks defined in the Histogram DB

- you can define/edit/mask your checks simply using a web interface

- custom analysis tasks (using the common tools in the OMAlib package) can be implemented as well;

- Savesets are NOT modified by Analysis

- Analysis output consists of messages (Warnings or Alarms)

- you can see the messages and the associated histograms using the Presenter (see Peter's talk), they also appear as Gaudi warnings/errors in the logViewer

OMAlib algorithms

algorithms currently implemented (OMAlib v2r7) for performing checks:

CheckMeanAndSigma check that the Histogram average and standard deviation are in the specified ranges

GaussFit like CheckMeanAndSigma, but check is performed on the result of a gaussian fit

CheckHolesAndSpikes check for holes and spikes with respect to: a reference Histogram or a fitted polinomial, in terms of ratio, absolute difference or significance, and check fit parameters and/or χ^2

CheckDeadBins check for bins that are "significantly" empty (the expected value can be taken from a reference histogram)

CheckXRange check that all Histogram entries are in a given range

CheckEntriesInRange check that a given fraction (or absolute value) of entries are in a given range

Fit Fit with a function among

- gaussian
- exponential
- landau
- polynomial
- double gaussian
- gaussian + polynomial
- your favorite... (a specific function for RICH already implemented by Chris Blanks)

IfbMonitor custom analysis of RICH histograms by Ross Young

How to define your (DB driven) analysis

- use HistDB web interface lbhistogramdb.cern.ch

- look for your histogram record and click on "Add Automatic Analysis" . You can specify:

  - algorithm

  - thresholds on output parameters (warnings and alarms)

  - input parameters (depending on algorithm)

  - associated error messages (from next release)

  - documentation for shifters (from next release)

Add/Update Automatic Analysis for histogram 19794

Analysis *CheckMeanAndSigma*

Documentation

Specific Message (when going in warning/alarm)

Check that the Histogram average and standard deviation are in the specified ranges with a given normal confidence l (default is 0.95)

Input Parameter	Value
confidence	.95

Parameter	Warning	Alarm
MinMean	-1.00e+6	-1.00e+6
MaxMean	1.00e+6	1.00e+6
MinSigma	-1.00e+6	-1.00e+6
MaxSigma	1.00e+6	1.00e+6

Confirm

slide 6

Alarms

- saved in histogram DB

- best viewer is Presenter

- you can list them using */group/online/scripts/dumpOMAlarms*

- they get deleted if

  - the check runs on a new saveset without producing messages, provided a sufficient statistics is available (statistic thresholds depending on algorithm or even on single analysis)

  - the alarm is not confirmed for a given timeout (currently 8 hours)

OMAlib tools for histogram display

OMAlib also includes tools that are used by the Presenter to perform on–the–fly operations on histograms at display time (independently on analysis)

- virtual histograms (produced on the fly when requested)
- can be defined from the HistDB Web Interface (click on "Create Virtual Histogram")
- Available algorithms:

  Divide Ratio of two histograms

  Efficiency Ratio of two histograms with binomial errors

  HMerge Merge histograms into a single histogram with possibly variable bin sizes

  Scale Divide all bins of the first histogram by the content of the first bin of the second histogram.

- perform a fit when displaying an histogram (fit function can be associated to histograms using web interface, click on "Specify Display Options")

Status

Since June 10, automatic analysis is running regularly on online monitoring histograms (hist01 node):

- DB–driven analysis task for LHCB and FEST partitions (one task per partition)

- no custom analysis tasks requested so far, please contact me if you need it

- documentation is being prepared